



Owner's Manual

The Ark



Ark 508 Expander

Ark 504

Ark 516 Expander

Ark 516

www.oceanaudio.co.uk

Contents

1.	Introduction	3
2.	Features	4
3.	Quick start	5
3.1	Power Connections	6
3.2	Audio Connections	7
3.3	Connecting without patchbay and without modules installed.....	7
3.4	Connecting without patchbay but with modules installed	8
3.5	Using the console with a patchbay	9
4.	Audio Connections - Wiring D-Sub connectors	10
4.1	Standard D-Sub pin connection	11
4.2	Master Insert Sends, Returns & Master Outputs D-Sub pin connections .	12
4.3	Control Room, Alt Mon & Studio Playback D-Sub pin connections	13
4.4	2-Track Returns D-Sub pin connections	14
4.5	Auxiliary Sends D-Sub pin connections	15
5.	The Ark input module	16
6.	The Ark submaster module (Ark 504 and 516 only).....	20
7.	The Ark master module (Ark 504 and 516 only).....	24
8.	More on metering	28
9.	More on levels when using Digital Audio Interfaces	29
10.	More on speakers	30
11.	More on grounding	31
12.	Technical Specifications	32

Introduction

Thank you for your purchase of the Ark.
This manual is for all models of the Ark 500 range
(Ark 504, Ark 516, Ark 508 Expander and Ark 516 Expander)

We hope you'll have as much pleasure using it as we had designing and building it.

The Ark is designed by Malcolm Toft, who was the founder of console manufacturer Trident Audio Developments in 1972. Prior to that he was a recording engineer whose credits include the David Bowie 'Space Oddity' album, three albums with T-Rex and James Taylor's first album. He was also involved with the mixing of the Beatles 'Hey Jude' single at Trident Recording Studios in 1968.

Malcolm has been designing recording consoles for over forty years and some of the artists who have recorded hits on his consoles include: Stevie Wonder, Herbie Hancock, Rod Stewart, Queen, David Bowie and Elton John. More recently, Radiohead, Muse, Dire Straits, Coldplay and Oasis have added their name to the list. And now you !!

Malcolm was made a visiting professor by Leeds College of music in 2008 in recognition of his unique combination of experience as a recording engineer and console designer. It is this wealth of experience and pedigree that is brought to the design of the Ark consoles.

Enjoy working with the Ark

All the best



and the Ocean Audio team

Here are just a few artists, studios and bands whose names may sound familiar to you, and who have used, or are still using, consoles designed by Malcolm Toft.

Elton John - David Bowie - Queen - Lou Reed - Harry Nilsson - James Taylor - Carly Simon
The Eagles - The Beatles - T-Rex - Dire Straits - Bachman Turner Overdrive - Linda Rondstat
Supertramp - Thin Lizzy - George Harrison - Jeff Beck - Radiohead - Tony Visconti
Ringo Star - Paul McCartney - Brian Eno - Supertramp - Chris De Burgh - Ian Anderson
Amy Winehouse - The Manic Street Preachers - Ricky Nelson - Paul Weller - Oasis - Muse
The Chemical Brothers - Hard-Fi - The Nice - Rick Wakeman - Joe Cocker - The Move
Aphrodite's Child - Blood Sweat and Tears - The Nice - Phil Manzanera - The Record Plant LA
The Record Plant San Francisco - Chipping Norton Studios - Sarm Recording Studios
Trident Studios - Liverpool Institute of Performing Arts - Leeds College of Music - Sound 80 Minneapolis
Armin van Buuren - Lenny Kravitz - Dennis Ferrer - Vienna University of Performing Arts - Frank Sinatra
- Genesis - Cherokee Studios Hollywood

Features

The Ark is designed to be as flexible as possible. While it can be used as a traditional analogue console (just insert a Mic Pre and an EQ per channel), we would like to encourage you to explore all possibilities and use this console to really suit your workflow.

The Ark has been designed to fully support the 500 series module system.

- The Ark 504 provides slots and power for up to 16 of these modules.
- The Ark 516 provides slots and power for up to 40 of these modules.
- The Ark 508 expander adds another 16 slots.
- The Ark 516 expander adds another 32 slots.

Each input of each console accommodates two 500 series modules physically placed above them. The sub-master section of the Ark 504 and 516 provides for up to eight 500 series Modules.

The Ark provides all the infrastructure needed to make an extremely versatile recording console using any combination of 500 series mic pre-amplifiers, equalisers, compressors, effects, etc. available from a long list of manufacturers. This means that the console can in fact inherit the particular sound of any third party 500 series module you want to use.

The Ark consoles and expanders can be combined in any way you want.

Two expanders (either 508 or 516) can be connected to each of the 504 and 516 master consoles.

This gives you a huge number of 500 series slots and possibilities.

	Ark 504	Ark 516	Ark 508 Ex	Ark 516 Ex
Slots for 500 Series modules	16	40	16	32
Combined with Ark 504	-	-	32	48
Combined with Ark 516	-	-	56	72
Combined with Ark 508 Ex	32	56	-	-
Combined with Ark 516 Ex	48	72	-	-
Combined with two Ark 508 Ex	48	72	-	-
Combined with one Ark 508 Ex and one Ark 516 Ex	64	88	-	-
Combined with two Ark 516 Ex	80	104	-	-

The easiest way to implement use of 500 series modules in the Ark signal chain is to insert mic pre-amplifiers into the top row of slots and connect the outputs of these to the 'Channel External Inputs'.

500 series equalisers can be inserted into the lower row of slots and the inputs and outputs to these could be made via the 'Channel Insert Sends and Returns'. This will turn the Ark in a traditional analogue console.

Alternatively, and by using a patch bay, any chain of 500 series modules can be used on any of the inputs, outputs or inserts of the Ark. This gives you complete flexibility to create the sound you're after.

The console electronics have deliberately been designed to be as transparent and with as much headroom as possible. The Ark can be used without the addition of any 500 series modules as a stand alone line level console. In a multi-track studio environment the console will perform both tracking and remix functions equally well. All inputs and outputs are electronically balanced and ground sensing outputs are used to make sure that interfacing to external equipment is never compromised.

Because of the channel monitor and direct output facilities, recording instruments to a DAW or tape is simple and of very high quality. When mixing down, there is a large number of inputs to the stereo buss available. Here's an overview which shows you the number of inputs for any combination of Ark models :

	Ark 504	Ark 516	Ark 508 Ex	Ark 516 Ex
Total inputs to mix bus	24	48	16	32
Combined with Ark 504	-	-	40	56
Combined with Ark 516	-	-	64	80
Combined with Ark 508 Ex	40	64	-	-
Combined with Ark 516 Ex	56	80	-	-
Combined with two Ark 508 Ex	56	80	-	-
Combined with one Ark 508 Ex and one Ark 516 Ex	72	96	-	-
Combined with two Ark 516 Ex	88	112	-	-

The console has also been designed with ease of servicing in mind.

Its fully modular construction makes it a simple matter to remove any module should a component need replacing. All active circuitry (IC's etc) are socketed, again to aid servicing. All passive components (resistors, capacitors etc.) are of conventional types and are not surface mount (because surface mount components are difficult to remove and replace). The modules connect to each other via motherboards, which ensure maximum reliability and freedom from wiring errors.

Construction of the frame itself is a combination of aluminium and steel to ensure that the console is rigid yet as light as possible.

Connections to the console are via Tascam standard 25 way D-Sub connectors. This allows for easy connection to a patchbay which greatly increases the flexibility of the system.

The metering system accommodates either recording directly from the channel direct outputs or via the separate sub group section.

By carefully following the installation procedures detailed in the following pages, your Ark console will give you years of professional audio quality and reliable service.

Quick Start

3.1 Power Connections

The Ark 504, Ark 516 and Ark 516 Expander are supplied with a high quality power supply. The power supply of the Ark 504 has enough power for one additional Ark 508 expander. The Ark 508 Expander needs it's own power supply when used with the Ark 516.

Make sure to use an earthed cable when connecting the AC power source to the 3-pin euro socket at the back of the power supply.

The supply uses the latest 'switch mode' power techniques which negate the need for heavy and inefficient power transformers. They are also extremely efficient which means that despite their high current load capacity, they do not run hot. As a consequence cooling fans are not required and therefore the power supply is completely silent in operation. As they still generate a small amount of heat it is however always good practice to make sure that they operate in a well ventilated area, preferably with at least 1U rack space between the supply and other equipment.

Another advantage of switch mode power supplies is that they will operate on a wide AC input voltage range (100v to 260v AC). Consequently they can be operated virtually anywhere in the world without the need for adjustment.

The supplies are provided with short-circuit and over-voltage protection.

Low voltage DC is supplied to the console via a circular locking connector.

- Push the connector firmly into the mating socket on the rear of the console.
- Use the locking ring to make sure that the cable cannot be accidentally pulled from the console.
- Make sure you make all connections before switching on the power supply.

The DC power connections are as follows:

Pin 1	Ground
Pin 2	+16V
Pin 3	-16V
Pin 4	+8V
Pin 5	+48V

The power supply is fitted with four red LED's which indicate that the +16, -16, +8V and +48 voltages are functioning. If for any reason any of the LED's fail to illuminate, **do not operate the console**. Turn the power supply off immediately and check that the appropriate front panel fuse(s) are not blown. If any fuse has blown, replace with one of the same rating and try again. If the fuse has not blown or a replacement fails subsequently, seek qualified help.

3.2 Audio Connections

So as to provide complete flexibility and provide greater access to the many inputs and outputs available, the Ark uses the Tascam standard 25 way D-Sub connector system.

Because of this, when used without a patchbay certain functions in the console will not work unless they are 'normalled, through.

These functions are (as marked on the rear panel):

- 'Channel Insert Sends 1-8' to 'Channel Insert Returns 1-8',
- 'Channel Insert Sends 9-16' to 'Channel Insert Returns 9-16' (on the Ark 516 and 516 expander)
- 'Group Insert Sends 1-8' to 'Group Insert Returns 1-8' (on the Ark 504 and 516)
- 'Mas Ins Send/Ret' (on the Ark 504 and 516)

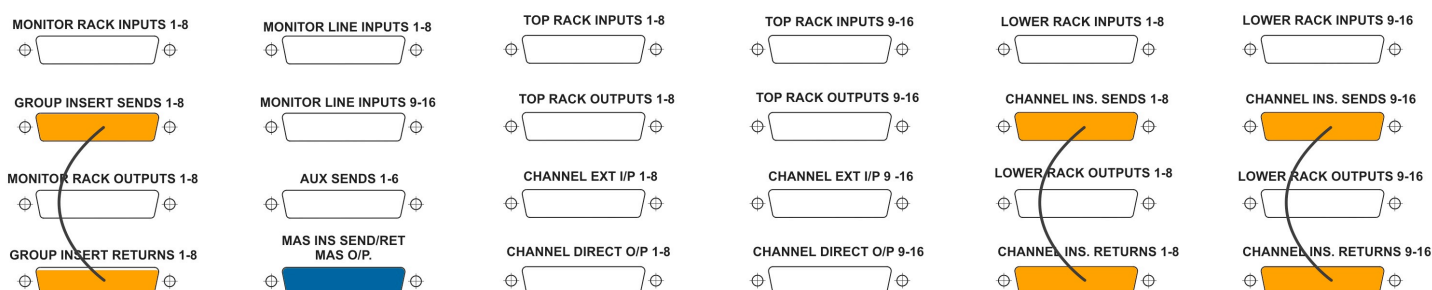
3.3 Connections without patchbay and without any modules installed

To use the Ark without any modules installed, you need to make a couple of connections to enable continuity of signal through the console:

- Connect 'Channel Insert Sends 1-8' to 'Channel Insert Returns 1-8'
 - Connect 'Channel Insert Sends 9-16' to 'Channel Insert Returns 9-16' (the Ark 516 and 516 expander)
 - Connect 'Group Insert Sends 1-8' to 'Group Insert Returns 1-8' (the Ark 504 and 516 only)
- These are in the same vertical rows so only short male to male 25 way D-Sub cables are needed.

- Connect the supplied factory assembled plug to the 'Mas Ins Send/Ret' connector (the Ark 504 and 516 only).

As the 'Mas Ins Send/Ret' linking is slightly more complicated due to the fact that the D-Sub connector on which these functions are located also provides the Master left/right outputs, a factory assembled plug is provided as a 'get you started' facility. This plug is located within the power supply packaging.



3.4 Connections without patchbay but with modules installed

For this example we'll install 16x Mic Pres in the Top Rack slots of the Ark 516, 16x EQs in the Lower Rack slots and 8x compressors in the Monitor Rack slots.

We need to make sure that we once again enable continuity of signal through the console. The connections are a bit different now.

- Connect 'Top Rack Outputs 1-8' to 'Channel Ext I/P 1-8'
- Connect 'Channel Insert Sends 1-8' to 'Lower Rack Inputs 1-8'
- Connect 'Lower Rack Outputs 1-8' to 'Channel Insert Returns 1-8'
- Do the same for channels 9-16
- Connect 'Group Insert Sends' to 'Monitor Rack Inputs'
- Connect 'Monitor Rack Outputs' to 'Group Insert Returns'

- Connect the supplied factory assembled plug to the 'Mas Ins Send/Ret' connector.

As the 'Mas Ins Send/Ret' linking is slightly more complicated due to the fact that the D-Sub connector on which these functions are located also provides the Master left/right outputs, a factory assembled plug is provided as a 'get you started' facility. This plug is located within the power supply packaging.

In this example, connect your microphones to the Top Rack Inputs.

The outputs of the Mic Pres will go to the Channel External Inputs.

You'll of course need to select Ext Input on every channel to get signal from your Mic Pres.

The input and output of the EQs are on the insert point of each channel.

This allows you to also use the EQs if you switch to the Line input.

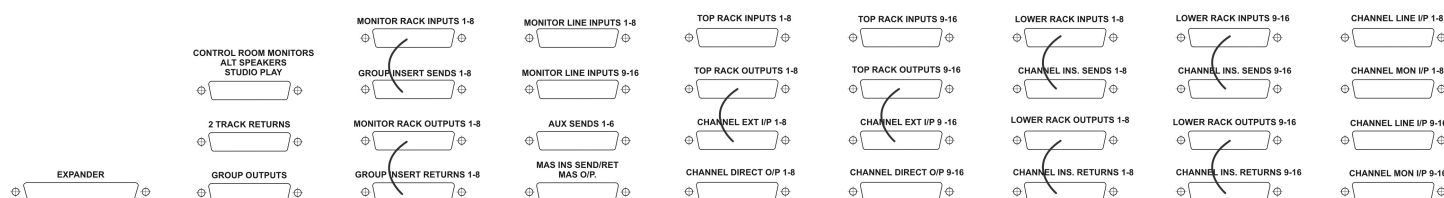
In our example, we also inserted compressors in the Monitor Racks, and connected these to the group inserts.

By routing the input channels to the group(s) we can use a compressor on any input channel or combination of channels.

This way, we can also use parallel compression, if we want.

Remember that the group output (after the insert return) is send to the master L/R bus if the Replay switch on the lower section of the submaster module is depressed (out).

Please check the section on The Ark subgroup module for details.



3.5 Using the console with a patchbay

The previous examples showed basic ways to use the Ark. But the Ark offers much more. And as with so many things in audio, there are not much rules. We would like to invite you to customise the connections so the Ark really suits your workflow.

But when using the Ark with a patchbay, you need to make sure that similar connections as described above are made. Ideally, you would use a "normalised" patchbay, to make it easy on yourself.

A possible way to do this could be as follows :

Use a patch bay which normals insert sends to lower rack inputs, and another patch bay which normals lower rack outputs to insert returns. So, the lower rack 500 series modules (most likely EQ or compressor) are connected to the insert points.

If you want to bypass the lower rack modules, you simply connect insert send and return on the patch bay.

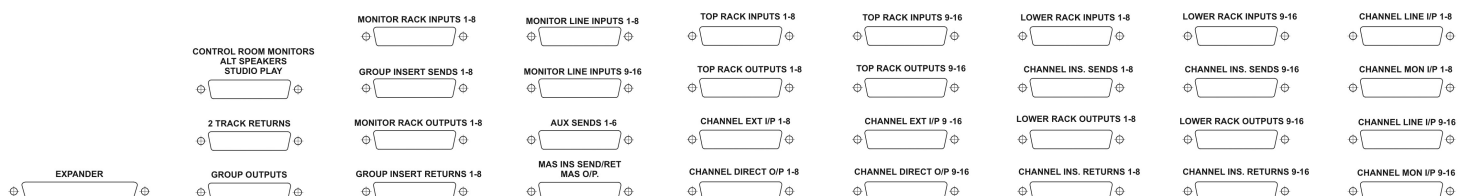
Combined with this, you can have a patch bay which normals the group insert sends to the monitor rack inputs; and another patch bay which normals the monitor rack outputs to the group insert returns (the monitor racks can for example hold compressor modules).

This way, you'll have a standard set up, but you still have the possibility to patch any module to any channel or group.

That is the strength of the Ark.

It not only allows you to fill it up with your preferred 500 series modules, and have the "colour" you want; but by using a patch bay, you can actually use any module - or chain of modules - on any channel or group. (now try that with a traditional analogue console)

Please see the section on "Audio Connections - Wiring" for correct wiring instructions of all D-Sub connectors.



Important Notes :

*** The D-Sub connectors on the Ark are analogue audio connectors.**

DO NOT connect them to digital D-Sub connectors (such as can be found on some DAW interfaces) or bad things can happen.

*** D-Sub connectors are - by design - per 8 channels.**

If you have only a couple of 500 modules installed (less than 8), you need to make sure that you pass signal through the "empty" slots of the console.

If you don't use a patchbay, you can use D-Sub to XLR cables to make all connections.

You can also use the Ocean Audio 500 I/O connect.

The 500 I/O connect is a 500 series module without any components. It just links the input to the output, and is inserted in the unused slot.

Audio connections

The console uses 25 way 'D-Sub' connectors which follow the Tascam standard for audio wiring. This universal standard makes it compatible with any other piece of professional analogue audio equipment (such as patchbays etc.) that follow this standard.

It is also possible to construct cables using the IDC (insulation displacement connector) technique using .05" ribbon cable. This makes it very quick and simple to manufacture interface cabling for the console.

All connections to the console require male D-Sub connectors.

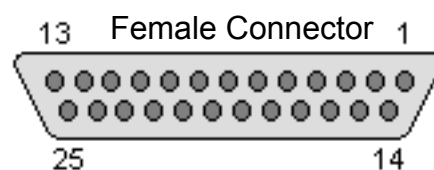
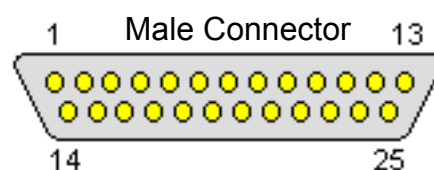
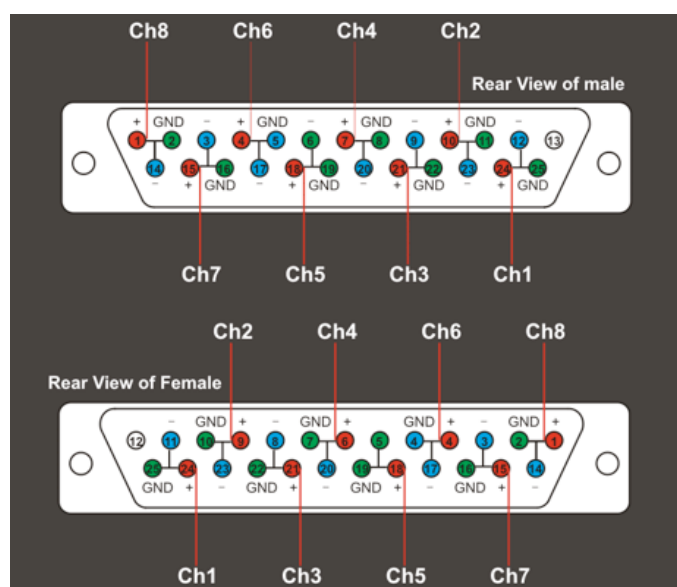
As the connections follow the Tascam wiring convention and the majority of connectors provide 8 balanced audio signals, wiring for these connectors is identical.

A table on the next page details the wiring convention.

There are only four exceptions to this:

- 1) the master left/right inserts and master outputs connector on Ark 504 and 516
- 2) the control room, alternate monitors and studio playback connector on Ark 504 and 516
- 3) the 2 track returns connector on Ark 504 and 516
- 4) the auxiliary sends connector on Ark 504 and 516

They still follow the standard wiring convention but either do not have all 8 signal pairs wired or require detail for left/right signals. Consequently these have their own wiring sheets which are shown individually.

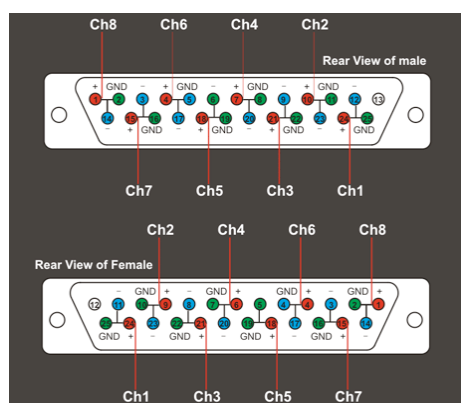


4.1 Standard D-Sub pin connections (Ark 504, 516, 508 Ex and 516 Ex)

Pin Number	Description
1	Channel 8 +
2	Channel 8 Earth
3	Channel 7 -
4	Channel 6 +
5	Channel 6 Earth
6	Channel 5 -
7	Channel 4 +
8	Channel 4 Earth
9	Channel 3 -
10	Channel 2 +
11	Channel 2 Earth
12	Channel 1 -
13	No Connection
14	Channel 8 -
15	Channel 7 +
16	Channel 7 Earth
17	Channel 6 -
18	Channel 5 +
19	Channel 5 Earth
20	Channel 4 -
21	Channel 3 +
22	Channel 3 Earth
23	Channel 2 -
24	Channel 1 +
25	Channel 1 Earth

4.2 Master Insert Sends, Returns & Master Outputs D-Sub connections (Ark 504 and 516)

Pin Number	Description
1	No Connection
2	No Connection
3	No Connection
4	Stereo Master Output Left +
5	Stereo Master Output Left Ground
6	Stereo Master Output Right -
7	Stereo Master Insert Return Left +
8	Stereo Master Insert Return Ground
9	Stereo Master Insert Return Right -
10	Stereo Master Insert Send Left +
11	Stereo Master Insert Send Right Ground
12	Stereo Master Insert Send Right-
13	No Connection
14	No Connection
15	No Connection
16	Earth
17	Stereo Master Output Left -
18	Stereo Master Output Right +
19	Stereo Master Output Right Ground
20	Stereo Master Insert Return Left -
21	Stereo Master Insert Return Right +
22	Stereo Master Insert Return Left Ground
23	Stereo Master Insert Send Left -
24	Stereo Master Insert Send Right +
25	Stereo Master Insert Send Left Ground

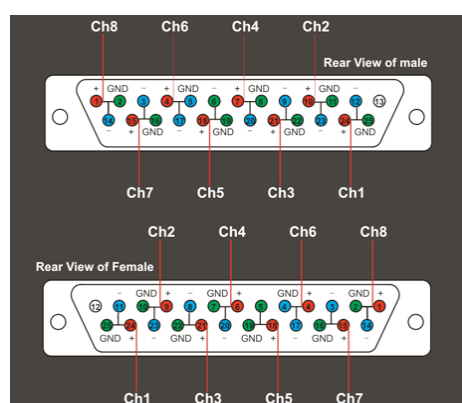


Following Standard Tascam Audio Connections:

- Channel 1: Master Insert Send Right
- Channel 2: Master Insert Send Left
- Channel 3: Master Insert Return Right
- Channel 4: Master Insert Return Left
- Channel 5: Master Output Right
- Channel 6: Master Output Left
- Channel 7: No Connection
- Channel 8: No Connection

4.3 Control Room, Alt Mon & Studio Playback D-Sub pin connections (Ark 504 and 516)

Pin Number	Description
1	Studio Play Left +
2	Studio Play left Ground
3	Studio Play Right -
4	Alt Speaker 2 Left +
5	Alt Speaker 2 Left Ground
6	Alt Speaker 2 Right -
7	Alt Speaker 1 Left +
8	Alt Speaker 1 Left Ground
9	Alt Speaker 1 Right -
10	Control Room Left +
11	Control Room Left Ground
12	Control Room Right -
13	Empty
14	Studio Play Left -
15	Studio Play Right +
16	Studio Play Right Earth
17	Alt Speaker 2 Left -
18	Alt Speaker 2 Right +
19	Alt Speaker 2 Right Ground
20	Alt Speaker 1 Left -
21	Alt Speaker 1 Right +
22	Alt Speaker 1 Right Ground
23	Control Room Left -
24	Control Room Right +
25	Control Room Right Ground

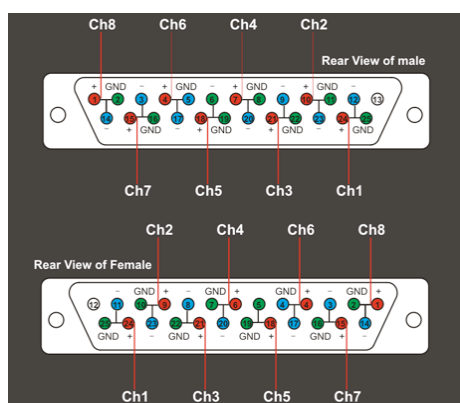


Following Standard Tascam Audio Connections:

Channel 1: Control Room Right
Channel 2: Control Room Left
Channel 3: Alt 1 Right
Channel 4: Alt 1 Left
Channel 5: Alt 2 Left
Channel 6: Alt 2 Right
Channel 7: Studio Play Right
Channel 8: Studio Play Left

4.4 2-Track Returns D-Sub pin connections (Ark 504 and 516)

Pin Number	Description
1	No Connection
2	No Connection
3	No Connection
4	No Connection
5	No Connection
6	No Connection
7	2 Track 2 Return Right +
8	2 Track 2 Return Ground
9	2 Track 2 Return Left -
10	2 Track 1 Return Right +
11	2 Track 1 Return Right Ground
12	2 Track 1 Return Left -
13	No Connection
14	No Connection
15	No Connection
16	No Connection
17	No Connection
18	No Connection
19	No Connection
20	2 Track 2 Return Right -
21	2 Track 2 Return Left +
22	2 Track 2 Return Left Ground
23	2 Track 1 Return Right -
24	2 Track 1 Return Left +
25	2 Track 1 Return Left Ground

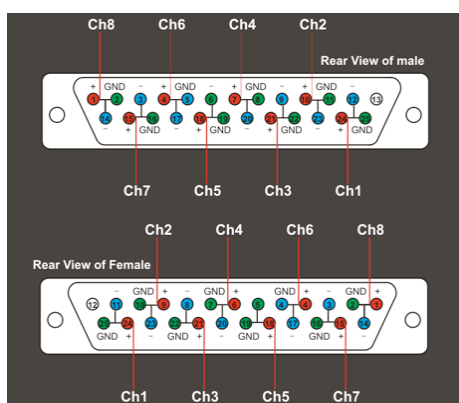


Following Standard Tascam Audio Connections:

Channel 1: 2 Track 1 Return Left
Channel 2: 2 Track 1 Return Right
Channel 3: 2 Track 2 Return Left
Channel 4: 2 Track 2 Return Right
Channel 5: No Connection
Channel 6: No Connection
Channel 7: No Connection
Channel 8: No Connection

4.5 Auxiliary Sends D-Sub pin connections (Ark 504 and 516)

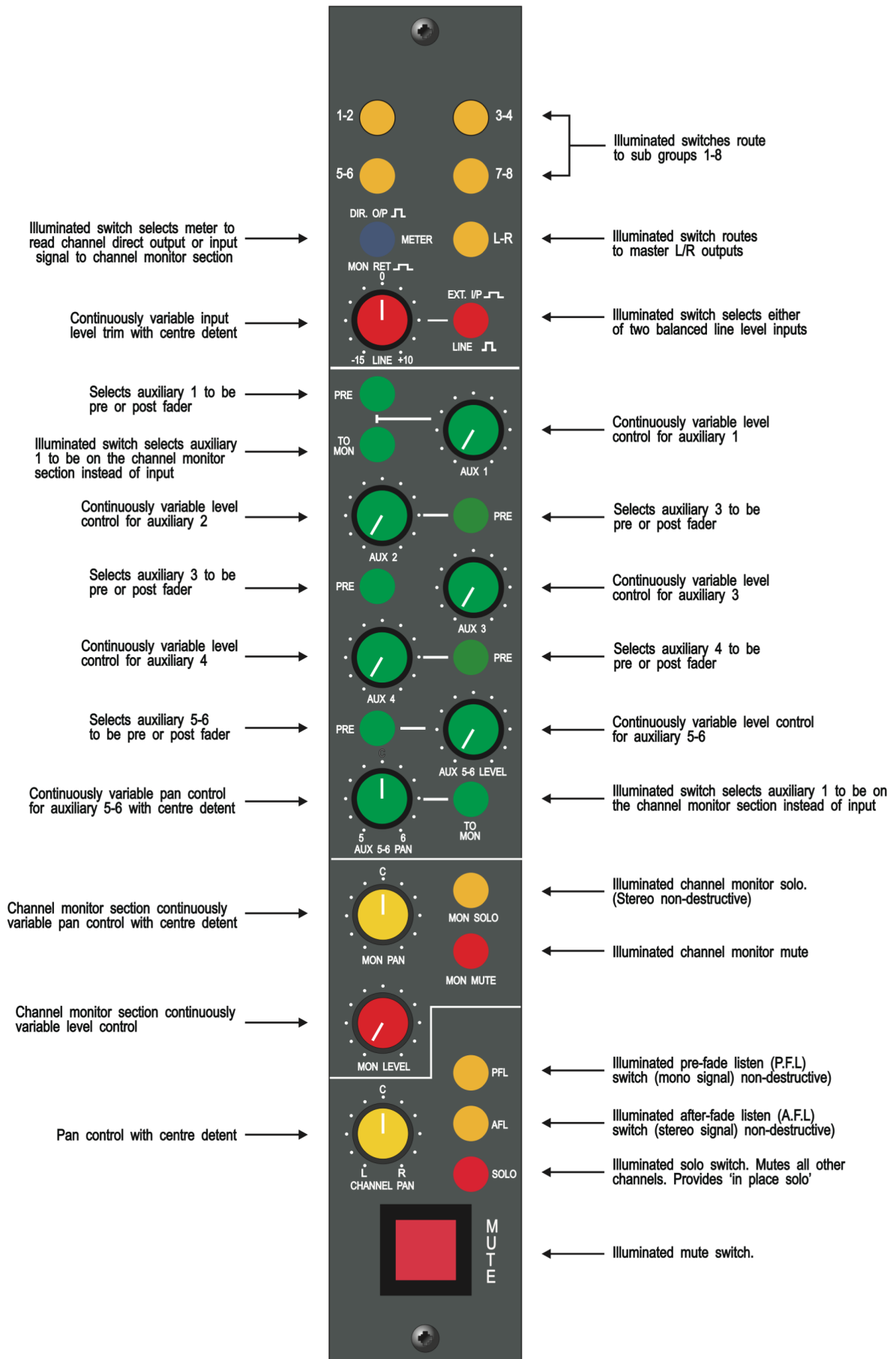
Pin Number	Description
1	No Connection
2	No Connection
3	Aux Send 7 -
4	Aux Send 6 +
5	Aux Send 6 Earth
6	Aux Send 5 -
7	Aux Send 4 +
8	Aux Send 4 Earth
9	Aux Send 3 -
10	Aux Send 2 +
11	Aux Send 2 Earth
12	Aux Send 1 -
13	No Connection
14	No Connection
15	No Connection
16	No Connection
17	Aux Send 6 -
18	Aux Send 5 +
19	Aux Send 5 Earth
20	Aux Send 4 -
21	Aux Send 3 +
22	Aux Send 3 Earth
23	Aux Send 2 -
24	Aux Send 1 +
25	Aux Send 1 Earth



Following Standard Tascam Audio Connections:

Channel 1: Aux Send 1
 Channel 2: Aux Send 2
 Channel 3: Aux Send 3
 Channel 4: Aux Send 4
 Channel 5: Aux Send 5
 Channel 6: Aux Send 6
 Channel 7: No Connection
 Channel 8: No Connection

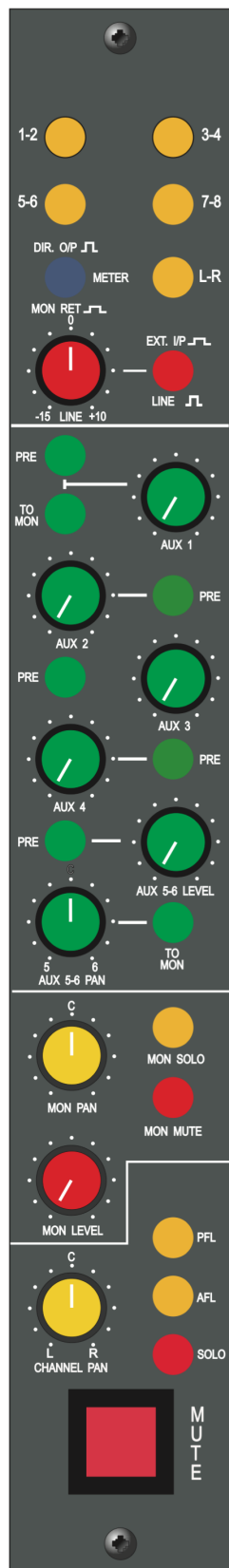
5. Input Module (Ark 504, 516, 508 Ex and 516 Ex)



Input module operational description (Ark 504, 516, 508 Ex, 516 Ex)

The Ark input module is an extremely versatile channel strip that provides all the facilities necessary for multi-track recording and mixing.

All of the switches / pushbuttons are illuminated when activated.
Exception to this are the pre/post switches for the Aux sends.



At the top of the module, eight pushbuttons route the signal to the 8 sub groups in odd and even pairs.

If required, the channel pan control can be used to direct the signal to an individual sub group by turning it fully left for an odd numbered sub group or fully right for an even numbered sub group.

A further pushbutton routes the signal to the master left/right outputs and again by using the channel pan control, the signal can be routed to either the left or right master output.

The meter switch allows it's associated VU meter to read either the channel direct output signal when non illuminated or the signal feeding the channel monitor section when the button is depressed (illuminated). These individual channel metering select switches work in conjunction with the master meter switch located at the top of the master module. Please check the "More on Metering" section of this manual for details.

Below the meter switch is the channel input level control. It is continuously variable with a convenient centre detent (click) position which denotes that the control is set for '0' meaning that the input is set for unity gain. Attenuation of up to -15db is provided so that the input signal can be matched for high levels often encountered from some DAW systems. Gain of up to +10db is provided so that low level signals can be brought up to provide suitable recording levels.

Next to the input level control is the input selection between two balanced input sources referred to as 'External Input' or 'Line Input'. This actually emulates the mic/line input switching of a conventional analogue recording console. A typical example of this might be where the 'External Input' is connected to a 500 series slot containing a microphone pre-amplifier while the 'Line Input' is connected to the output of a DAW multi-track system, possibly going through another 500 series slot hosting an EQ for example.

Situated below the input level controls are the six auxiliary sends.

These consist of four mono (auxiliaries 1-4) and one stereo (auxiliaries 5-6.)

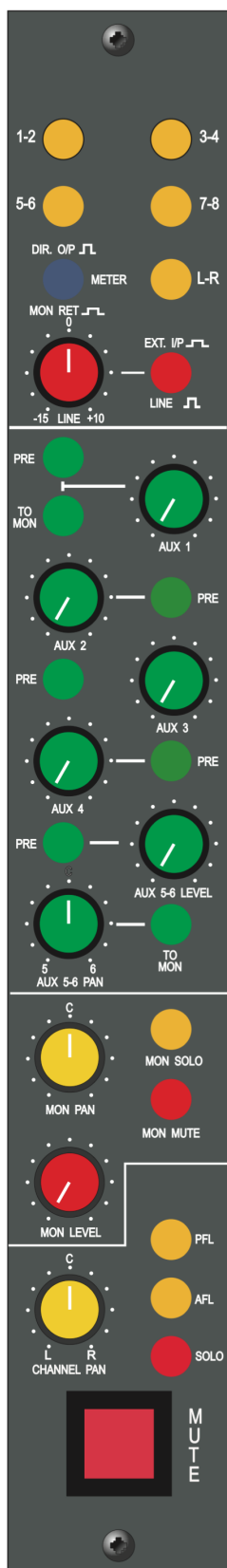
All auxiliaries can be selected pre or post fader.

Additionally, auxiliary sends 1 and 5-6 can be routed to the channel monitor section, thus providing auxiliary send facilities from the monitor section.

Below the auxiliary sends is the channel monitor section. This is in effect another independent input channel that operates separately from the main one. The purpose of the channel monitor section is to provide a means of monitoring the replay signal from a DAW or other recording device (such as a good old analogue multi-track tape recorder).

Using the direct outputs as sends to the multitrack and the channel monitor section as returns it is possible to monitor the send (input) and replay (output) to the multi-track recorder. Used in conjunction with the meter switching as described above, this feature provides a very flexible and convenient way to record multi-track.

The input to the channel monitor section is balanced and the signal level can be controlled via the 'Mon Level' control. A 'Mon Pan' control allows the signal to be panned between the master left and right outputs. This has a centre detent (click) so that it is easy to find the central position. Also provided are a solo (after fade listen) switch so that the signal can be heard in isolation and is non destructive; and mute switch that kills the channel monitor signal.



As previously mentioned, auxiliaries 1 and 5-6 can be “moved” to the channel monitor section so that they are no longer a part of the input section. So you can actually split the AUX sends. 3 on the channel input, and 3 on the monitor section. This allows you to provide a headphone or effect send mix from the channel monitor section.

The advantage of providing a headphone mix from the channel monitor section is that when building up a multi-track recording and overdubbing signals, the artist will always be able to hear both what has been recorded and what they are about to record. This greatly adds to the continuity of the recording process.

A complete multi-track mix can therefore be built up on the channel monitor section very easily during multi-track recording.

Below the channel monitor section is the input channel pan control which has a centre detent (click) so that it is easy to find the central position and a large illuminated mute switch.

A ‘Solo’ switch mutes all other channels but the one selected.

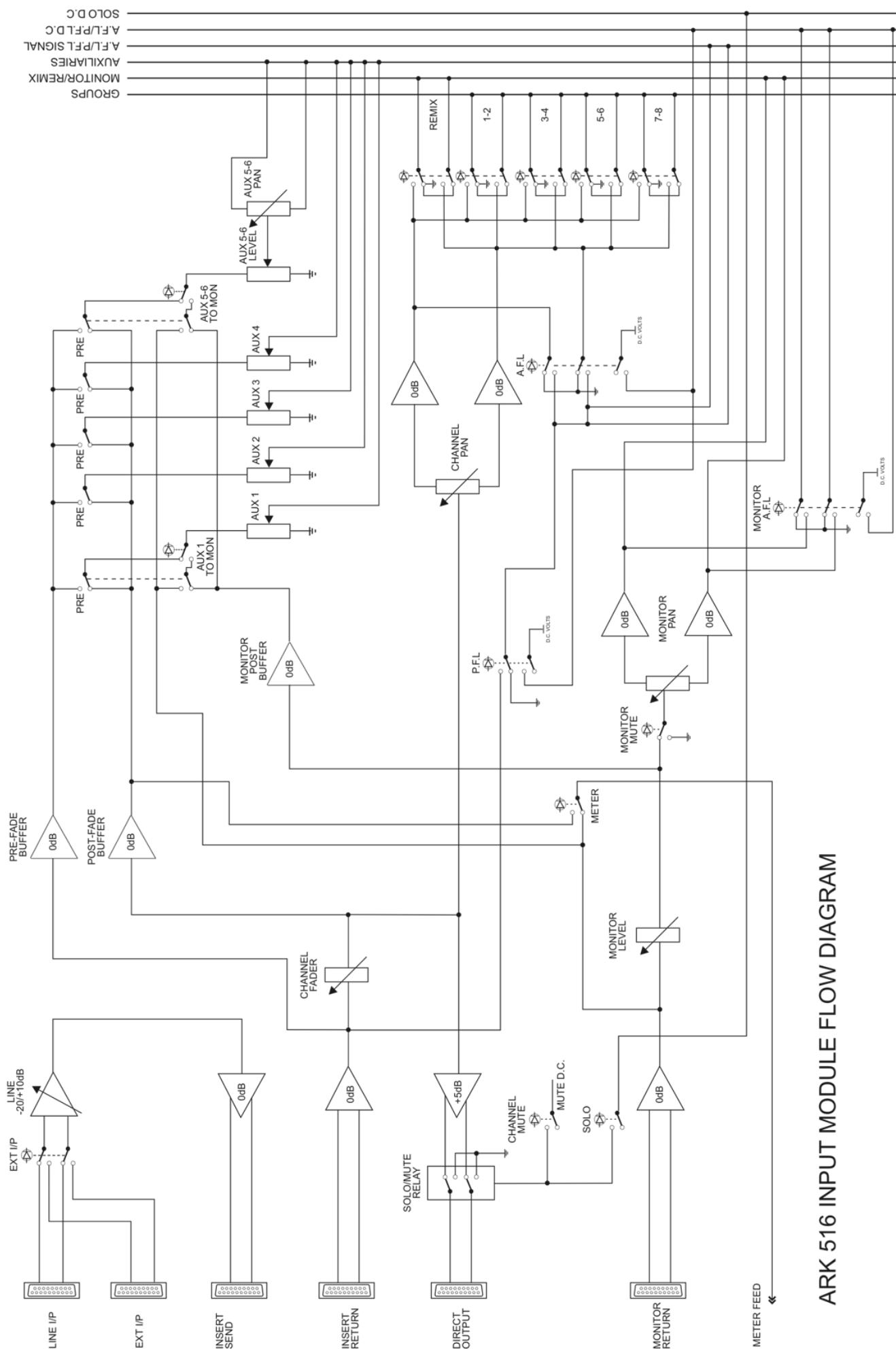
This performs like a Solo-in-Place (SIP). All other channels will be muted and those mute switches will illuminate. Since all other channel signals are muted, this is also referred to as ‘destructive’. Be careful when using this during mixdown since it will alter the mix feeding the left/right master outputs.

A ‘PFL’ switch (pre-fader listen) gives you the signal in isolation before the channel fader and pan as a quick and easy method of checking if there is signal present. As it is pre-fader and pan, the signal appears on the monitor speakers in mono.

An ‘AFL’ (after-fader listen) switch provides a stereo after fader and pan signal which is useful for checking the stereo position or channel signal in isolation. Both the ‘PFL and AFL’ switches are non destructive, which means that they can be used during a mix without affecting the main signal.

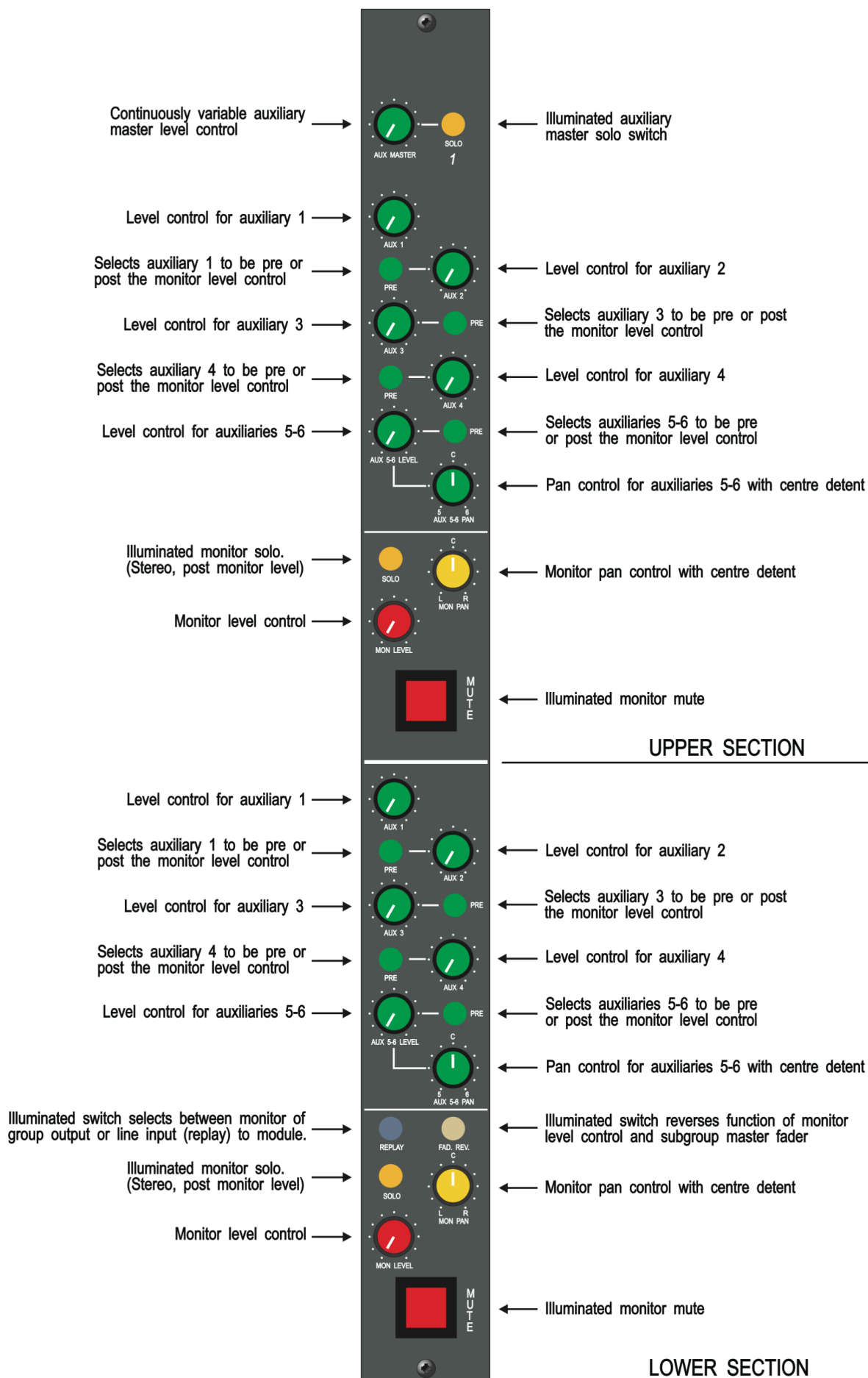
Below every channel is a high quality fader for precise control of signal level.

Reference to the signal flow diagram will give a better understanding of the input module’s features and facilities.



ARK 516 INPUT MODULE FLOW DIAGRAM

6. Submaster Module (Ark 504 and 516)

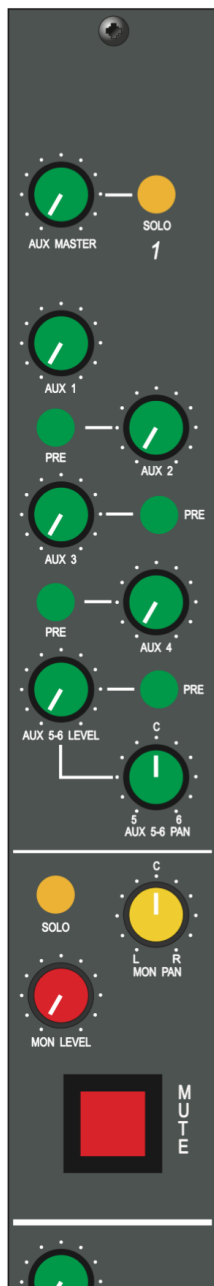


Submaster module operational description (Ark 504 and 516 only)

The submaster modules provide all of the facilities necessary when using the 8 sub group outputs. They provide monitoring of not only the 8 subgroups but an additional 8 line level returns, so that 16 track recordings can be monitored.

Each submaster module consists of an upper and lower section. The facilities are very similar except that the lower section provides extra controls for the 8 subgroup outputs.

At the top of submaster modules 1 to 6 are the master level controls for the 6 auxiliary sends together with an illuminated switch that makes it possible to solo the mixed auxiliary send signal on the control room monitor



Upper subgroup section

The upper subgroup section only provides monitoring of a single line level input labelled 'Monitor Line Inputs 9-16' on the rear panel of the console.

The 8 subgroup outputs and 16 returns are balanced to provide the best possible quality when monitoring through the submaster section.

Below master aux send level controls are the auxiliary sends for the upper submaster section. Like the input module, they provide individual level controls and pre/post switching for auxiliaries 1 to 4 whilst 5 and 6 being stereo have a single pre/post select switch.

An illuminated solo switch provides a stereo signal in isolation to the control room speakers from the submaster selected.

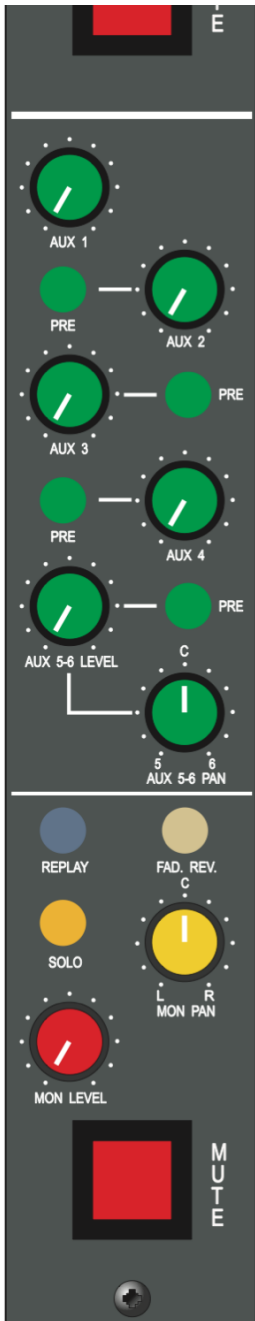
A monitor pan control with centre detent (click) makes it possible to place the signal anywhere in the stereo perspective. This control is also operative when the solo button is depressed.

A monitor level control provides precise adjustment of the signal being monitored from the particular submaster module.

A large 'Mute' switch kills the monitor signal for that particular submaster module.

When the master meter switch (situated at the top of the master module) is depressed the VU meter appropriate to submasters 9-16 will indicate the signal level at the input to the module. This is unaffected by the monitor level control or pan.

This completes the upper subgroup section.



Lower subgroup section

At the top of the lower section are an identical set of auxiliary send controls to those found on the upper section and they perform the same function.

A 'Replay' switch selects monitoring through the lower section to be the output of the respective subgroup below, or a balanced line level signal connected to the Monitor Line Inputs 1-8 on the rear panel of The Ark. This means that the subgroup output is automatically routed to the master L/R bus when this switch is undepressed. In combination with the group inserts, this can be used for parallel compression, etc. When depressed / illuminated, these switches will route the Monitor Line Inputs 1-8 to the master L/R bus (through the monitor level controls)

As with the upper section, when the master meter switch (situated at the top of the master module) is depressed the VU meter appropriate to submaster's 1-8 will indicate the signal level according to the position of the replay switch. This signal is unaffected by the monitor level control or pan.

The solo switch provides a stereo signal in isolation to the control room speakers from the submaster selected.

A monitor pan control with centre detent (click) makes it possible to place the signal anywhere in the stereo perspective. This control is also operative when the solo button is depressed.

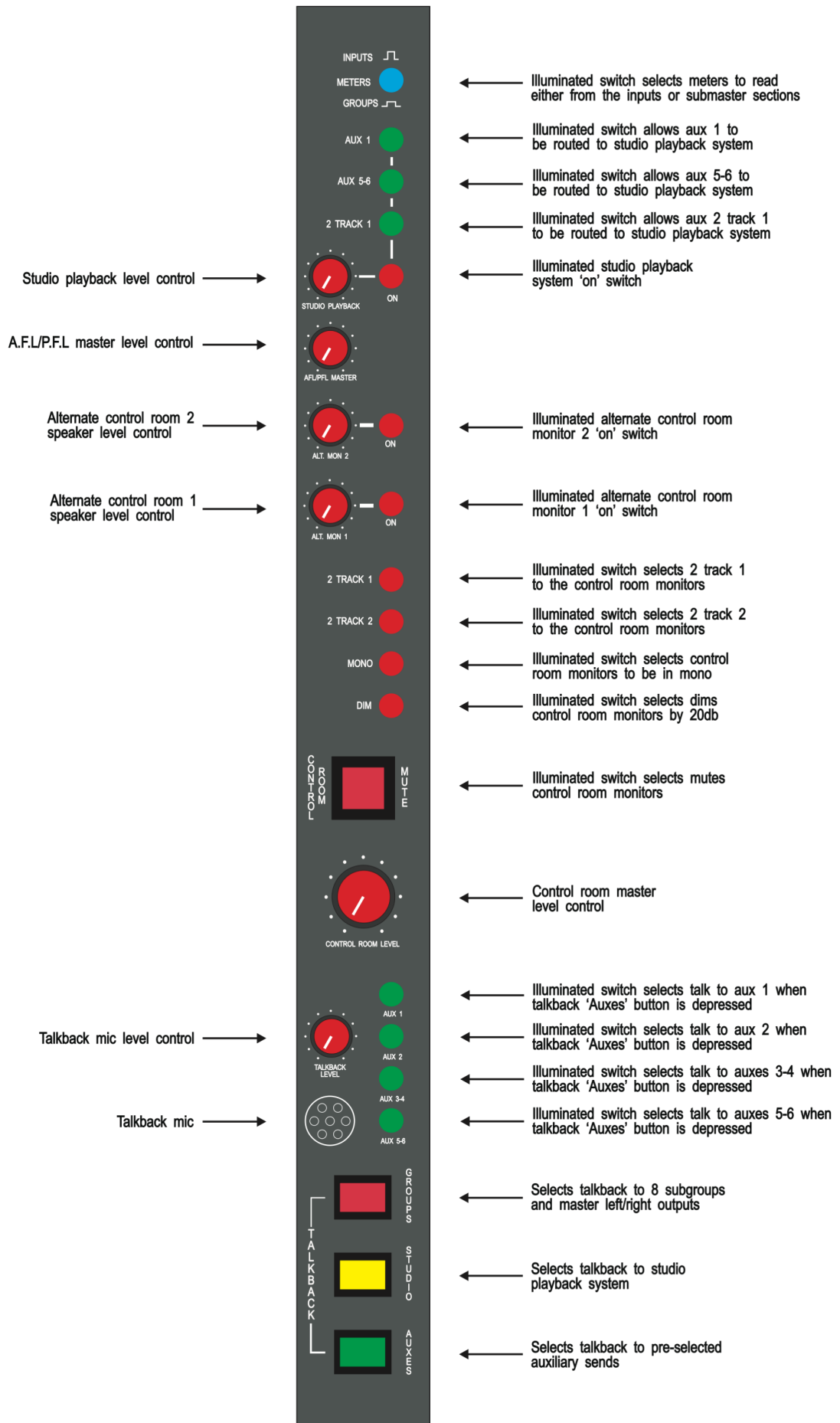
A monitor level control provides precise adjustment of the signal being monitored from the particular submaster module.

A 'Fader Reverse' switch makes it possible to reverse the function of the monitor level control and the subgroup fader associated with that particular module (located directly beneath it). This facility is provided because in mixdown mode, the 16 subgroups (when the lower section is selected to replay) provide an additional 16 balanced line inputs to the stereo master mix. When the fader reverse buttons are depressed, control of the input signal is then via the fader rather than the rotary monitor level control. This gives precise fader control over 24 inputs when mixing down.

A large 'Mute' switch kills the monitor signal for that particular submaster module.

Reference to the signal flow diagram will give a better understanding of the submaster module's features and facilities.

7. Master Module (Ark 504 and 516)

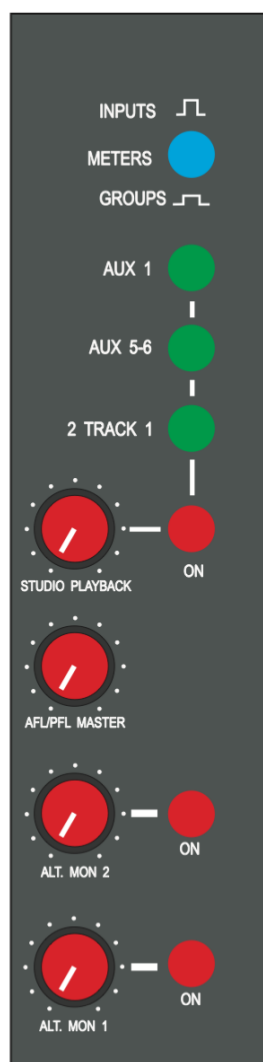


Master module operational description (Ark 504 and 516 only)

The master module of the Ark 504 and 516 contains all of the controls that affect the overall functionality of the console.

Associated with the master module are an accurately matched 100mm stereo fader which controls the level of the master stereo balanced outputs together with a pair of very accurate 16 segment bargraph and two moving coil VU meters which indicate the signal being sent from the master left/right stereo outputs. The VU meters read in parallel with the bargraph meters making it possible to compare the signal measured on the two different types of meters.

By their nature, bargraph meters such as the ones fitted to the Ark console, respond very quickly to signal peaks and are useful when used on instruments with complex dynamic waveforms such as pianos etc. This type of meter greatly assists the engineer when it comes to avoiding distortion during recording. However, when used on less complex waveforms generated by for example, an electric guitar, it is possible to under record the instrument using a bargraph display as they will sometimes react too much to the peak amplitudes of the signal and not the average amplitude. They will however, generally result in a better use of the available dynamic range of the recording medium. An analogue meter such as the conventional VU meter fitted to the Ark 516 console, responds mostly to the average level of the programme, so can therefore be considered more useful when recording instruments such as an electric guitar. The combination of electronic bargraph and analogue metering provides the user with the best of both worlds.



At the top of the master module is the master meter switch. This selects the 16 VU meters situated above the input modules to read either the channel direct outputs or channel monitor line inputs as selected individually on the input modules. In the depressed (illuminated) mode, the 16 VU meters read the signal from the submaster section of the console and will read either the 8 subgroup outputs on meters 1-8 or the replay of 8 line level sources on any of the meters associated with submasters 1-8 according to whether 'replay' is selected. On submasters 9-16 the meters will read the line level signal associated with that particular submaster.

Below the master meter switch are the controls associated with the audio playback system. Studio playback is an essential function when the artists are recording in a separate room from the recording engineer and it is either necessary to communicate to them without the need for headphones or to play back what is being heard in the control room or alternately a signal (such as a 2 track source i.e. a backing track) that is not being heard in the control room. It is also a useful feature if a vocalist prefers to hear the signal they are recording on speakers rather than headphones.

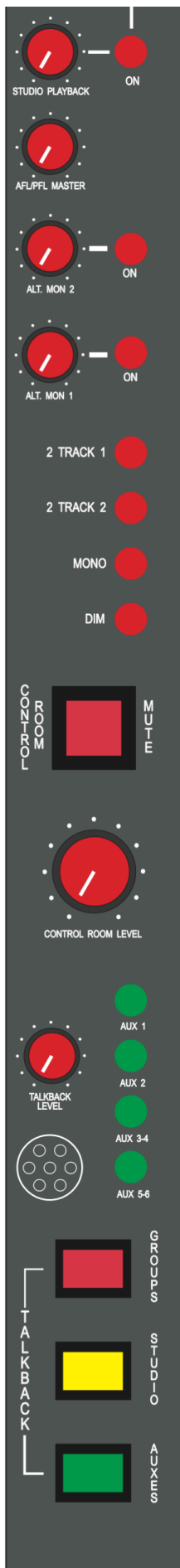
A stereo master level control is provided together with an on/off switch. Three switches select the source to the studio playback system. When no switch is depressed, the default signal is the same as that in the control room.

When 'Aux 1' is depressed, whatever signal is being fed to auxiliary 1 will be heard through the studio playback speakers. When 'Aux 5-6' is depressed, whatever signal is being fed to auxiliaries 5-6 will be heard through the studio playback speakers.

If the '2 Track 1' switch is depressed, whatever signal is connected to the 2 track 1 left and right D-Sub connector on the back of the console will be heard on the studio playback speakers.

Below the studio playback controls is the master level control for the AFL / PFL system. This stereo level control adjusts the signal level in the control room speakers of whatever signal is selected to be monitored. As the AFL / PFL system is a separate mixing buss, it is possible to solo any number of signals according to requirements.

Associated with the AFL / PFL system is a large flashing LED situated between the two master VU meters so no Solo button will stay engaged unnoticed.



Next in the master module are the controls for alternate control room monitor speakers 1 and 2. In conjunction with the standard control room monitor system these controls make it possible to have up to three different control room monitor speaker systems selectable from the console.

Each of the alternate control room speaker systems consist of a stereo level control and an illuminated 'on' switch. The signal being heard depends on the signal selected via the main control room monitor source switches.

Below the alternate control room monitor controls are the source selector switches for the main control room monitor speakers.

Four illuminated switches select either one of two 2 track sources or for the control room monitors to be in mono or dimmed by 20db.

A large illuminated mute switch kills the control room monitor signal.

A large stereo control room monitor level control allows for precise setting of the control room speaker level. As detailed in the 'More on Speakers' section it is very important that the control room master level control is correctly matched to the control room speaker system and these should be referred to when setting up the console to the control room monitor system.

A comprehensive talkback system is provided which incorporates a high quality electret microphone and amplifier with a continuously variable level control. The signal can be routed via momentary action switches to either the 8 subgroups and master left/right outputs, selected auxiliary sends, or the studio playback speakers.

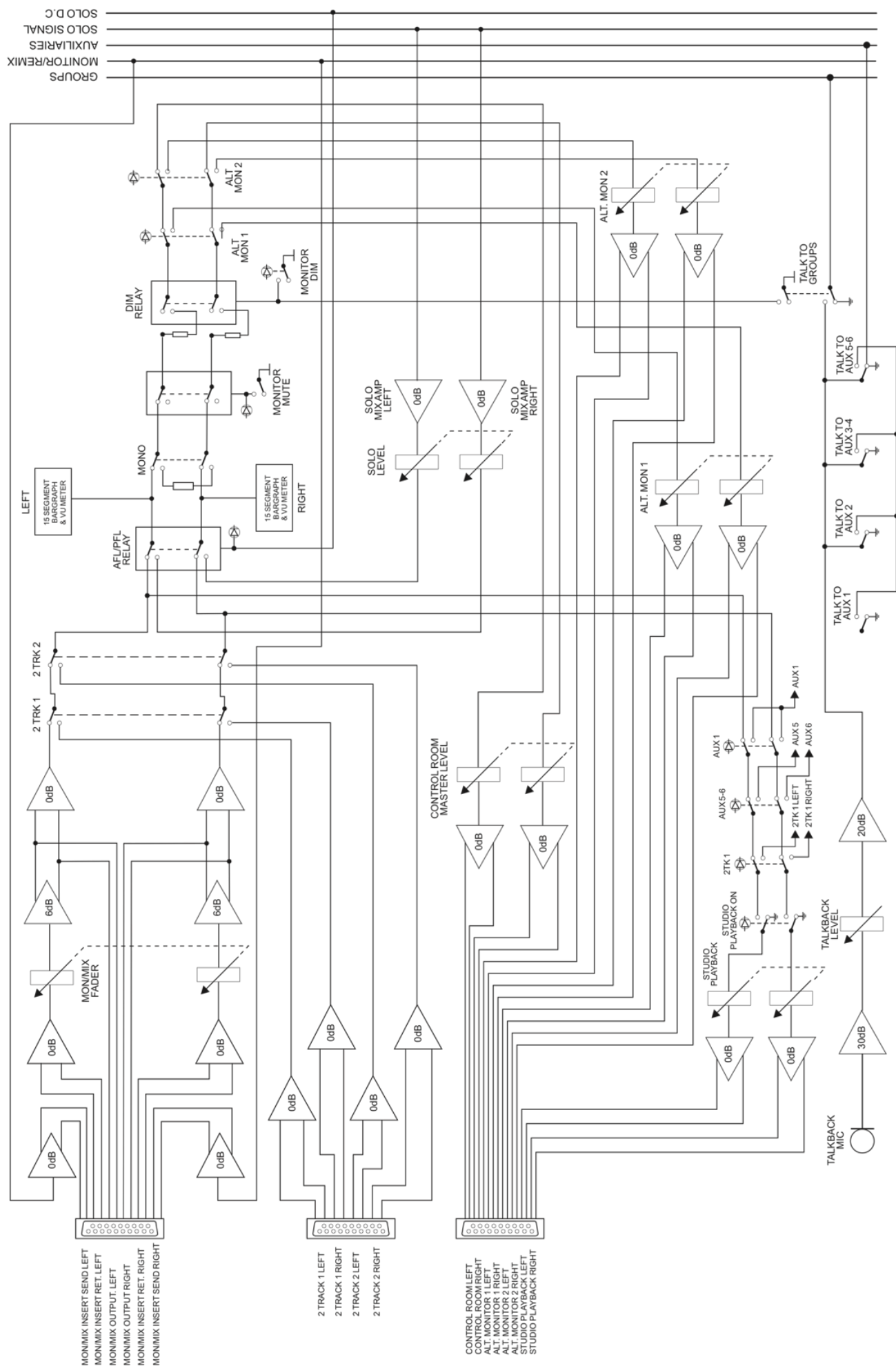
When the 'Groups' switch is depressed, the talkback signal is routed to the 8 subgroups and the master left/right outputs. This is useful for 'slate' announcements (so that the title of a song can be recorded at the beginning).

When the 'Studio' switch is depressed, the talkback signal is routed to the studio playback speakers for communication to musicians in a separate recording room who may not be wearing headphones.

The 'Auxes' switch operates in conjunction with four illuminated switches which select which auxiliary buss the engineer wishes to communicate with. These comprise aux 1, aux 2, auxes 3-4 and auxes 5-6. This selection is provided because it might not always be desirable to talk to all headphone mixes simultaneously.

When any talkback button is depressed, the monitor signal is dimmed by 20db to avoid feedback in the control monitor speakers.

Reference to the master module signal flow diagram will help to give a better understanding of the way in which the signal is routed.



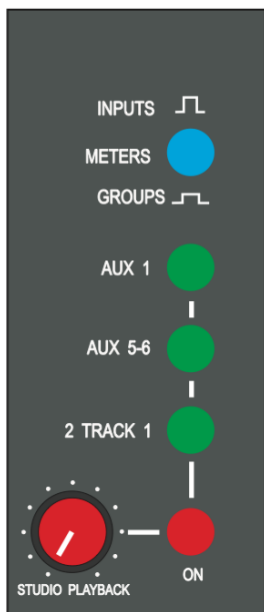
ARK 516 MASTER MODULE FLOW DIAGRAM

More on Metering

The metering on the Ark is very versatile.

But since there are 3 different locations on the console, which determine what gets shown on the VU meters (LED meters on the Ark 504), it's important that this is well understood.

Most important is the Master Meter Switch on top of the Master Module. This selection determines if the meters read from the input channels or from the submaster section.



Master Meter Switch undepressed (out)

Meters 1 - 16 will read signal from the channels (meters 1 - 4 on the Ark 504)

Each channel's associated meter will read either the channel direct output or the channel monitor input. Selection - per channel - is made with the Channel Meter Switch, situated just below the subgroup buttons.

Master Meter Switch depressed (in)

Meters 1 - 16 will read signal from the submaster section of the console.

Meters 1 - 8 will read either the subgroup outputs or the monitor line inputs 1 - 8 (lower section of the submaster modules) depending on each Replay switch.

Meters 9 - 16 will read monitor line inputs 9 - 16 (upper section of the submaster modules).

More on levels when using Digital Audio Interfaces

The Ark has been designed to operate at standard professional operating levels
'0' on the VU meters corresponds to +4dBm (1.225V),
'0' on the master bargraph meters corresponds to 0dBm (0.775V).

When connecting a Digital Audio Interface it is important to set the levels of your interface, so it matches correctly with the console. Digital interface levels are generally calibrated in dBFS (dB Full Scale) and they do not directly correlate to dBm.

For example, 0dBFS can be equivalent to +24dBm. Since 0dBFS is the maximum level which can be handled by the Digital Audio Interface, you should not set 0dBFS to be the same as 0dBm.

Setting your interface output to 0dBFS is obviously going to cause severe headroom problems through the console. Similarly, setting the interface input to 0dBFS means that you are going to require a large output from the console to drive the interface.

A more sensible approach is to set the interface input and output levels to between -20dBFS (+4dBm equivalent) and -24dBFS (0dBm equivalent).
Check the manual of your interface for instructions on how to do this.

The way to check that you have the levels set to their optimum for working with the ARK 516 is to adopt the following procedure:

Set the interface output to between -20dBFS and -24dBFS and connect it to the console channel line input. Make sure the channel input level control is set to it's midway (centre detent position) and that the channel fader is set to maximum. With the channel VU meter set to read the channel direct output, play a signal through the channel. Use a test oscillator or a synth set to generate a constant sine-wave tone of about 1kHz (two octaves above middle C).

The VU meter should read around '0' on average and maybe peak into the red area on occasional peaks. If the signal level is not high enough or is too high, adjust the interface output so that the signal gives a similar reading on the VU meter.

When connecting to the input of an interface, send a signal from the console that again reads around '0' on the VU meter with occasional peaks into the red and adjust the interface input level so that it reads between -24dBFS and -20dBFS. This can be reduced (anywhere between -18dBFS and -12dBFS) in conjunction with the manufacturers instructions for the best operating level.

Make sure to repeat this for every input and output of your interface.
Once the interface is set up to match the console using the above method, connecting to any of the other console inputs such as channel monitor inputs or sub group returns will ensure that the levels are matched correctly.

Sound on Sound magazine did a very good background article on this subject, which can be freely consulted at the following link :
<http://www.soundonsound.com/sos/may00/articles/digital.htm>

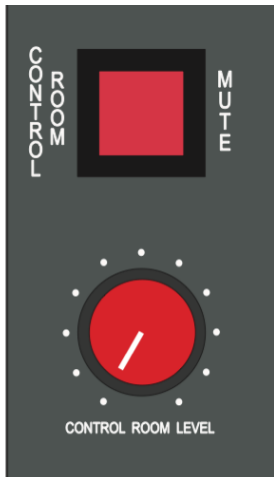
While this article dates from May 2000, the information is still valid.

Important Note :

If your Digital Audio Interface features digital D-Sub connectors, DO NOT connect them to the Ark's D-Sub connectors. Only connect analogue D-Sub connectors from your Digital Audio Interface to the analogue connectors of The Ark.

More on speakers

Make sure to take care when interfacing the console to control room monitor speakers. Many control room monitors nowadays are self powered systems and contain their own amplifiers. These systems often have as much as 20db gain internally and therefore if connected directly to the console without any attenuation will mean that the console control room monitor level control (or the alternate monitor control room level controls) will operate at the low end of their travel (below mid-way).



This means that level matching between the left and right speakers will not be optimum since at below mid-way travel the matching of stereo level controls is never as good as from mid-way to maximum. There is also the risk of damaging the control room monitor system (or your ears) if the control room master level control is accidentally turned to maximum.

If the control room speaker system has it's own level controls, the optimum set-up is to turn the speaker level controls to minimum and the console master level control to maximum. Then, using playback of source material that modulates the master level meters to a satisfactory level, the speaker level controls should be advanced until the control room speaker level is at the maximum volume that is ever likely to be required. The console master level control can then be used in it's optimum position and will provide much more flexible control of the control room speaker systems. This procedure will also apply to use of the alternate control room monitor systems and studio playback.

More on grounding

By connecting equipment together using the 'star grounding' principle it is possible to virtually eliminate hum loops from studio wiring.

Since the system is quite easy to implement, it only requires following a certain procedure that will soon become second nature. A few moments spent studying this chapter and following the steps listed below, could pay dividends in the future.

Step 1. Choose a particular piece of equipment that will be made 'technical' earth (in most cases the mixing console is the ideal choice as it is usually the item that everything else is connected to).

Step 2. On all equipment that is connected to the console inputs, connect the earth (sleeve) of the cable carrying the signal at the console end but not the end that connects to the equipment. For example, if it is a jack lead, connect the sleeve at the mixer end but not at the equipment end. The only exception to this should be a microphone as it cannot get an electrical earth by any other means. The earth should therefore be connected at both ends of a microphone cable.

Step 3. On all equipment that is connected to the console outputs, connect the earth (sleeve) at the console end but not at the equipment end (input).

Step 4. Connect the chassis or mains earth of all equipment to the same point that the console chassis and power supply earth are connected to. This point is then known as the 'technical' earth and should be as good as it possibly can be. In many cases this will be the earth of the mains socket feeding the console, but sometimes better results and freedom from refrigerator clicks and pops etc. can be achieved by making an independent 'technical' earth. In many professional recording studios this is done by burying a large copper plate at least three feet (one meter) underground and connecting the 'technical' earth point to it. A less drastic measure is to use the copper pipe of a radiator as the earth reference as this often runs underground.

It is essential that if a separate technical earth is generated, this is always used as the earth point for all equipment. Connecting some equipment to mains earth and some to 'technical' earth could result in a shock hazard as it is sometimes possible for a quite high AC voltage difference to be generated across the two earth points.

Dimensions

All versions of the Ark have the same Depth and Height :

94 x 37 cm / 37,01 x 14,57 inch

	Width in centimeters	Width in inches
Ark 504	55	21,65
Ark 516	101	39,76
Ark 508 expander	35,5	13,98
Ark 516 expander	66,5	26,18

Technical Specifications

Input Impedance :	20K ohms (balanced)
Output Impedance :	<150 ohms (balanced)
Frequency Response Input to Group Output :	± 1 db 20Hz to 30kHz
Maximum Output level (Headroom) :	+27dbm (balanced)
Distortion :	<0.05% at +26dbm
Line Input Gain Control :	+10db, -15db
Direct Output Gain :	+6db (balanced)
Group Output Gain :	+6db (balanced)
Group Noise (all channels routed) :	<-75dbm 20Hz to 20kHz
Crosstalk (group to group) :	<-70db 20Hz to 20kHz
Dynamic Range :	>102db
Total Current available for 500 Series modules (± 16 V D.C.) :	> 5.5 Amps
Ark 516 - Average Current available per 500 Series module :	> 135mA

Note:

All inputs and outputs are electronically balanced with ground sensing on the negative phase outputs.